

CLAIMS

We claim:

- 1 1. A semiconductor processing chamber having at least one interior surface
2 comprising electrochemically roughened aluminum or aluminum alloy.
- 1 2. The semiconductor processing chamber of Claim 1, wherein said at least one
2 interior surface has a surface roughness ranging from about 100 Ra to about 200 Ra.
- 1 3. The semiconductor processing chamber of Claim 2, wherein said surface roughness
2 ranges from about 110 Ra to about 160 Ra.
- 1 4. The semiconductor processing chamber of Claim 1, wherein said electrochemically
2 roughened aluminum or aluminum alloy surface has the appearance of rolling hills and
3 valleys, when magnified.
- 1 5. The semiconductor processing chamber of Claim 4, wherein the height of said hills
2 ranges from about 8 μm to about 25 μm .
- 1 6. The semiconductor processing chamber of Claim 4 or Claim 5, wherein the distance
2 between the center of one hill and the center of an adjacent hill ranges from about 30 μm to
3 about 100 μm .

1 7. The semiconductor processing chamber of Claim 1, wherein said electrochemically
2 roughened aluminum or aluminum alloy surface underlies a coating selected from the group
3 consisting of an anodized coating, a flame spray-deposited aluminum oxide coating, a ceramic
4 coating, and an anodized coating having a ceramic coating applied thereover.

1 8. The semiconductor processing chamber of Claim 1, wherein byproducts generated
2 during an etch process or a deposition process adhere to said electrochemically roughened
3 aluminum surface.

1 9. The semiconductor processing chamber of Claim 1, wherein said semiconductor
2 processing chamber is selected from the group consisting of an etch chamber and a deposition
3 chamber.

1 10. The semiconductor processing chamber of Claim 9, wherein said semiconductor
2 processing chamber is an etch chamber which is used for etching a material selected from the
3 group consisting of a dielectric material, a metal, and polysilicon.

1 11. The semiconductor processing chamber of Claim 9, wherein said semiconductor
2 processing chamber is an etch chamber, and wherein fluorine and carbon from an etch process
3 react to form a polymer which adheres to said electrochemically roughened aluminum surface.

1 12. A processing component for use within a semiconductor processing chamber,
2 wherein said processing component has at least one electrochemically roughened aluminum
3 or aluminum alloy surface.

1 13. The processing component of Claim 12, wherein said electrochemically roughened
2 aluminum or aluminum alloy surface has a surface roughness ranging from about 100 Ra to
3 about 200 Ra.

1 14. The processing component of Claim 13, wherein said surface roughness ranges
2 from about 110 Ra to about 160 Ra.

1 15. The processing component of Claim 12, wherein said electrochemically roughened
2 aluminum or aluminum alloy surface has the appearance of rolling hills and valleys, when
3 magnified.

1 16. The processing component of Claim 15, wherein the height of said hills ranges from
2 about 8 μm to about 25 μm .

1 17. The processing component of Claim 15 or Claim 16, wherein the distance between
2 the center of one hill and the center of an adjacent hill ranges from about 30 μm to about 100
3 μm .

1 18. The processing component of Claim 12, wherein said electrochemically roughened
2 aluminum or aluminum alloy surface underlies a coating selected from the group consisting
3 of an anodized coating, a flame spray-deposited aluminum oxide coating, a ceramic coating,
4 and an anodized coating having a ceramic coating applied thereover.

1 19. The processing component of Claim 12, wherein byproducts generated during an
2 etch process or a deposition process adhere to said electrochemically roughened aluminum or
3 aluminum alloy surface.

1 20. The processing component of Claim 12, wherein said processing component is used
2 within a semiconductor processing chamber selected from the group consisting of an etch
3 chamber and a deposition chamber.

1 21. The processing component of Claim 20, wherein said semiconductor processing
2 chamber is an etch chamber which is used for etching a material selected from the group
3 consisting of a dielectric material, a metal, and polysilicon.

1 22. The processing component of Claim 20, wherein said semiconductor processing
2 chamber is an etch chamber, and wherein fluorine and carbon from an etch process react to
3 form a polymer which adheres to said electrochemically roughened surface.

1 23. The processing component of Claim 12, wherein said processing component is
2 selected from the group consisting of: a wall liner, a cathode liner, a slit valve door, a slit
3 valve liner, a buffer insert, and a gas distribution plate.

1 24. A semiconductor processing apparatus surface, wherein said surface comprises
2 electrochemically roughened aluminum or aluminum alloy.

1 25. The semiconductor processing apparatus surface of Claim 24, wherein said surface
2 has a surface roughness ranging from about 100 Ra to about 200 Ra.

1 26. The semiconductor processing apparatus surface of Claim 25, wherein said surface
2 roughness ranges from about 110 Ra to about 160 Ra.

1 27. The semiconductor processing apparatus surface of Claim 24, wherein said
2 electrochemically roughened aluminum or aluminum alloy surface has the appearance of
3 rolling hills and valleys, when magnified.

1 28. The semiconductor processing apparatus surface of Claim 27, wherein the height
2 of said hills ranges from about 8 μm to about 25 μm .

1 29. The semiconductor processing apparatus surface of Claim 27 or Claim 28, wherein
2 the distance between the center of one hill and the center of an adjacent hill ranges from about
30 μm to about 100 μm .

1 30. The semiconductor processing apparatus surface of Claim 24, wherein said surface
2 underlies a coating selected from the group consisting of an anodized coating, a flame spray-
3 deposited aluminum oxide coating, a ceramic coating, and an anodized coating having a
4 ceramic coating applied thereover.

1 31. The semiconductor processing apparatus surface of Claim 24, wherein byproducts
2 generated during an etch process or a deposition process adhere to said electrochemically
3 roughened surface.

1 32. The semiconductor processing apparatus surface of Claim 31, wherein fluorine and
2 carbon from an etch process react to form a polymer which adheres to said surface.

1 33. The semiconductor processing apparatus surface of Claim 24, wherein said surface
2 is present on an apparatus component selected from the group consisting of: a wall liner, a
3 cathode liner, a slit valve door, a slit valve liner, a buffer insert, and a gas distribution plate.

1 34. A method for electrochemically roughening a surface comprising aluminum or an
2 aluminum alloy, including the steps of:

3 a) immersing said surface in an HCl solution having a concentration ranging from
4 about 1 volume % to about 5 volume %, at a temperature ranging from about 45°C to about
5 80°C; and

6 b) applying an electrical charge having a charge density ranging from about
7 80 amps/ft.² to about 250 amps/ft.² for a time period ranging from about 4 minutes to about
8 25 minutes.

1 35. The method of Claim 34, wherein said HCl solution has a concentration ranging
2 from about 1 volume % to about 3 volume %.

1 36. The method of Claim 35, wherein said temperature of said HCl solution ranges
2 from about 50°C to about 70°C.

1 37. The method of Claim 34, wherein said HCl solution further includes a chelating
2 agent, and wherein said chelating agent is present at a concentration within the range of about
3 0.5 volume % to about 3 volume %.

1 38. The method of Claim 37, wherein said chelating agent is gluconic acid.

1 39. The method of Claim 34, wherein said charge density ranges from about 120
2 amps/ft.² to about 250 amps/ft.².

1 40. The method of Claim 34, wherein said time period ranges from about 4 minutes to
2 about 20 minutes.

1 41. The method of Claim 34, wherein said aluminum-comprising surface is an
2 aluminum alloy selected from the group consisting of 6061 and LP.

1 42. The method of Claim 41, wherein said HCl solution concentration ranges from
2 about 1 volume % to about 1.5 volume %; wherein said temperature of said HCl solution
3 ranges from about 55°C to about 65°C; and wherein said charge density ranges from about
4 175 amps/ft.² to about 250 amps/ft.².

1 43. The method of Claim 42, wherein said HCl solution further includes a gluconic acid
2 chelating agent, which is present at a concentration within the range of about
3 0.9 volume % to about 1.1 volume %.

1 44. The method of Claim 43, wherein said time period during which said charge density
2 is present ranges from about 6 minutes to about 12 minutes, and the aluminum alloy is 6061.

1 45. The method of Claim 43, wherein said wherein said time period during which said
2 charge density is present ranges from about 4 minutes to about 8 minutes, and the aluminum
3 alloy is LP.